REMARKS

This is in response to the Office Action dated October 10, 2006. Applicants respectfully request reconsideration and allowance of the application in view of the above-amendments and the following remarks.

I. INFORMATION DISCLOSURE STATEMENT

The Office Action indicated that the list of references provided in Annex E is not a proper information disclosure statement and that such references have not been considered.

Applicants enclose herewith is a supplemental Information Disclosure Statement (and fee) with copies of the following documents cited in Annex E, which appear to be closest to the present application, but not relevant to the claims:

[15] P. Heller, T. Karp, and T. Q. Nguyen. A general formulation of modulated filter banks. *Submitted to IEEE Transactions on Signal Processing* 1996.

[3] B. Le Floch, M. Alard, and C. Berrou. Coded Orthogonal Frequency Division Multiplex. *Proceedings of the IEEE, 83:982-996,* June 1995.

[4] A. Vahlin and N. Holte. Optimal finite duration pulses for OFDM. *IEEE Trans. Communications,44(1):10-14, January 1996.*

[9] R. D. Koilpillai and P. P. Vaidyanathan. "Cosine-modulated FIR filter banks satisfying perfect reconstruction". *IEEE Transactions on Signal Processing, 40(4):770-783, April 1992.*

[10] T. Q. Nguyen and R. D. Koilpillai. The theory and design of arbitrary length cosine-modulated filter banks and wavelets satisfying perfect reconstruction. *IEEE Trans. Signal Processing*, SP-44(3):473-483, March *1996.*

Consideration of the above-references is respectfully requested.

II. AMENDMENTS TO THE SPECIFICATION

The specification is amended on page 16 in Equation (68) to correct a typographical error introduced by the English translation. This equation is correct in the corresponding PCT publication, from which the present application claims priority.

III. DRAWINGS

The drawings were objected to because several of the drawings allegedly lacked numeral or other labels for clearly identifying the elements described in the specification.

However, please note that the specification is mainly written in terms of equations, and the terms of these equations are clearly shown in the drawings. Therefore, it is believed that the original drawings clearly identify the elements described in the specification. In any case, the drawings have been amended as requested in the Office Action to include more reference numerals. Corresponding amendments have been made to the specification. The amendments made to the specification are directly deduced from the drawings and therefore do not introduce new matter.

The enclosed "Replacement Sheets" are informal. If the proposed drawing changes are acceptable to the Examiner, Applicant will submit clean, formal drawings for printing.

IV. CLAIM OBJECTIONS AND CLAIM REJECTIONS UNDER §112

Claims 1, 12 and 15-16 are amended as suggested in the Office Action to overcome minor informalities. With these amendments, Applicants respectfully request that the claim objections and the claim rejections under §112, second paragraph, be withdrawn.

Claims 9, 11 and 14 are amended to provide better antecedent basis for certain terms, and correspond to modes 3 and 4 disclosed in the specification, such as described on page 8, line 28 to page 9, line 2 and on page 11, lines 6-12.

Also, claim 5 is amended to include the equation for D from page 12, line 23 of the specification. Claim 7 is amended to correspond to the changes made to Equation (68) in the specification.

V. CLAIM REJECTIONS UNDER §103(a)

Claims 1, 2, 8, 12, 13, 15, 16, 18 and 20 were rejected as allegedly being unpatentable over Yeap et al. WO 98/09383 (Assigned to Bell Canada).

Claims 3, 4, 6, 9, 11, 14, 17, 19 and 21 were rejected as allegedly being unpatentable over Yeat et al. in view of Applicant's admitted prior art (AAPA).

A. **The Present Application**

The present patent application regards transmission of multicarrier signals called BFDM/OM, for:

- Biorthogonal Frequency Division Multiplex;
- Offset Modulation.

The present patent application is more precisely directed to modulation using a transmultiplexer structure.

As it appears in claim 1, the present patent application proposes a new and non obvious structure of such a transmultiplexer (the general principle of using a transmultiplexer being known in the art).

This transmultiplexer comprises:

at the modulator, a bunk of synthesis filter having 2M parallel branches each comprising an expander of order M; and

at the demodulator, a bunk of analysis filter having 2M parallel branches each comprising a decimator of order M.

One feature of an exemplary embodiment is therefore the ratio between the number of branches (2M) and the order (M) of each expander and decimator.

According to prior art, the number of branches is always less than the expander/decimator order. On the contrary, according to an exemplary embodiment, the number of branches is more than the expander/decimator order and specifically double.

This approach is clearly new, and non obvious. There is no disclosure of this feature in the art, nor any suggestion to choose a greater value (e.g., 2M) for the number of branches, and a fortiori, to choose this value as being exactly the double of the expander/decimator order.

This new approach, specifically designed for BFDM/OM signals appears to be very efficient, with numerous prototype filters.

B. **Yeap et al.**

The Examiner considers that Yeap et al. disclose a method for transmitting a biorthogonal signal, comprising the steps of modulation and demodulation of claim 1.

Applicants do not agree with the analysis of the Examiner. As previously explained, the discussed application does not regard the general principle of transmitting a multicarrier signal using a transmultiplexer structure (with analysis and synthesis filters). This structure is known from the art.

The invention recited in claim 1, for example, specifically regards a well-defined structure, characterized by the ratio 2M/M:

- 2M branches for
- expander/decimator order M,

which is designed specifically for BFDM/OM signals. Each branch has the same expander/decimator order M (as described in the specification on page 5, line 27 to page 6, line 10).

This is clearly not the case in the Yeap et al. document. As it appears on figure 6, and as it is explained on page 12:

(1) the order is not the same for each branch (M or 2M);

(2) there is no relation (such as ratio 2M/M) between the number of branches and the order; and

(3) the number of branches (e.g. 3) is always less than the order (at least 8).

Item (3) above clearly confirms that Yeap et al. corresponds to the prior art. See page 12, line 22: when there are 3 branches, M can be chosen between 8 to 24.

In contrast, according to the invention recited in claim 1, the number of branches is double of the order.

Moreover, Yeap et al. disclose no link (see item (2)) between the number of branches and the order. If there are 3 branches, one can choose one of several values (8 to 24) for the order, which is not linked to the number of branches.

In claim 1 of the present application, there is a well defined relation between M (order) and 2M (number of branches).

Moreover, according to the invention of claim 1, the branches are all associated with the same order (see item (1) above). This is not the case in Yeap et al., which is based on a very different approach. As a matter of fact, Yeap et al. regards a method based on wavelet decomposition, when claim 1 of the present application regards BFDM/OM.

In other words, both provide biorthogonality, but with very different methods and results.

One skilled in the art knows that wavelet decomposition is based on an "octave law", which implies specific expansion value (M, 2M, 2M in Yeap et al., for 3 branches).

On the contrary, the invention of claim 1 is based on a uniform order (M).

Because of the different basic structure between claim 1 of the present application and that disclosed by Yeap et al., there is no obviousness to consider Yeap et al. in a view to improve transmission of a BFDM/OM signal.

C. **Conclusion**

The Yeap et al. document is not relevant to the claims, because:

- It regards wavelet decomposition but not BFDM/OM, and both approaches are structurally different (so that solution to improve wavelet decomposition can not obviously be adapted to BFDM/OM);
- Branches of BELL have different orders, when branches of the invention have the same order (M);
- There is no relation, in BELL, between order and number of branches;
- And mainly, the number of branches (2M) is greater than, and more exactly double of the order (M).

As a result, claims 1-9 and 11-21 are new and non-obvious in view of Yeap et al. either alone or in combination with the AAPA.

The Director is authorized to charge any fee deficiency required by this paper or credit any overpayment to Deposit Account No. 23-1123.

Respectfully submitted,
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IN THE DRAWINGS

Please replace Figures 1-10 with the amended figures provided in the enclosed replacement sheets (each marked "Replacement Sheet")